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EXAMINER	
VANATTA, AMY B	

ART UNIT	PAPER NUMBER
3765	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/581,408	SHORT, ANDREW	
	Examiner	Art Unit	
	Amy B. Vanatta	3765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06012006,06282007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 10, the recitation "at least occasionally" renders the claim indefinite. It is unclear how many or how few occurrences is encompassed by the recitation "at least occasionally". The meaning of the term is not sufficiently precise, for example it cannot be ascertained even whether a single occurrence or plural occurrences are required. Thus, the scope of the claim is not ascertainable.

Likewise, the recitation "occasionally" in claims 3, 8, 9, and 28 render the claims indefinite.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section

> 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 5, 13, 14, 19, 20, and 27-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Sheehan et al (US 5,740,593).

Sheehan et al disclose a method of producing a fibrous perform including moving a needle-penetrable mold plate (12) containing a discontinuous fiber material relative to a needling device (16), along a first direction (see direction indicated by arrow 34 in Fig. 1, i.e. a horizontal forward direction). The needling device includes a needle member 14. While moving the needle-penetrable mold plate 12 along the first direction (34), needles 14 are passed through the fiber material to change an orientation of the fibers until a predetermined fiber content percentage is obtained as claimed (col. 5, lines 25-64). Sheehan discloses a step of "permitting" or "allowing" the needle-penetrable mold plate to move along a second direction generally transverse to the first direction; see Fig. 1 and mechanism 22 which moves the support 12 upwards or downwards (col. 5, lines 65- col. 6, line 5), this vertical movement being the claimed "second direction" as in claims 1, 27, and 28. Further regarding claim 27, the needling in the first direction is performed to increasing depths into the discontinuous fiber material as the plate moves in the first direction; see col. 6, lines 44-54, col. 7, lines 23-46, col. 8, lines 1-30 (in particular lines 21-23), col. 16, line 47 through col. 7, line 5, and cols. 21-23, disclosing that the depth to which the needling is performed needs to be increased as layers are added, to ensure adequate entangling of the fibers of the various layers. The plate is moved in the first direction a plurality of times as in claim 2; see arrows 34 and 36 and

col. 6, lines 5-18. The fibers comprise discontinuous PAN-based carbon fiber as in claim 5 (see, e.g., col. 7, line 2). The needling device is a needle loom as in claim 13, and the loom is a linear needle loom as in claim 14 (see elements 14, 16, and 18 in Fig. 1). Sheehan discloses passing the needles 14 through a part of the needle-penetrable mold plate (col. 5, lines 29-33), as in claim 19. The plate is moved along an upward angle (vertical direction) as in claim 20 (see mechanism 24 and col. 5, line 65 through col. 6, line 5). Regarding claim 29, the fibrous structure of Sheehan comprises carbon (col. 4, lines 47-66; col. 7, lines 1-22), and the layers which have already been needled, as more layers are needled thereon, form nonwoven fabric as in claim 29. Also see col. 8, lines 53-57, disclosing the use of filaments (tow).

5. Claims 1-3, 5, 10-15, 19-23, 28 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Lawton et al (US 4,955,123).

Lawton et al disclose a method of producing a fibrous perform including moving a needle-penetrable mold plate (40) containing a discontinuous fiber material relative to a needling device (55), along a first direction (i.e. the rotational direction defined by false bottom 74 and rotary receptacle 54); see Figs. 6 and 9b and col. 9, line 18- col. 10, line 27. The needling device includes a needle member (needle board 186 carrying needles). While moving the needle-penetrable mold plate 40 along the first direction, needles are passed through the fiber material to change an orientation of the fibers until a predetermined fiber content percentage is obtained as claimed (col. 9, lines 18-56; col. 11, line 18 through col. 12, line 23). Lawton discloses a step of “permitting” or

"allowing" the needle-penetrable mold plate to move along a second direction generally transverse to the first direction, i.e. in the vertical direction; see col. 3, lines 39-41 and 60-63, col. 9, lines 57-61, and col. 10, lines 31-34 and 52-67. This vertical movement forms the claimed "second direction" as in claims 1 and 28. The plate is moved in the first direction a plurality of times as in claim 2; see repetitive rotary motion described in col. 12, lines 17-19. The movement in the second direction is "superimposed" on the rotary movement and takes place during the needling operation (col. 3, lines 32-46), thus taking place while moving the mold plate along the first (rotary) direction, as in claim 3. Lawton discloses the use of PAN-based carbon fiber as in claim 5 (see col. 4, lines 53 and 60). The fiber material is provided in a mold cavity defined by support 40 and receptacle 54 (see Fig. 9b), as in claim 10. The mold cavity is generally circular as in claim 11, and includes a core 62 at the central part of the mold cavity so as to define an annular space into which the fiber material is received (col. 9, lines 39-42), as in claim 12. The needling device is a needle loom as in claim 13, and the loom is a linear needle loom as in claim 14 in that the needles reciprocate in a linear vertical manner (see needling head 55). The needle member passes through the fiber material through opposing sides of the fiber material, i.e. through the top side and the bottom side of the first few layers (col. 7, lines 35-38), as in claim 15. The needles pass through the mold plate 40 as in claim 19 (col. 7, lines 35-38; col. 8, lines 7-20; col. 14, lines 16-26). The plate is moved along an upward angle (vertical direction) as in claim 20. Lawton discloses carbonizing the fibers, densifying the fibers, and heat treating the fibers as in

claims 21-23 (col. 4, lines 52-64). Regarding claim 29, the carbon is in the form of filamentary tow (col. 4, line 52 through col. 5, lines 7).

6. Claims 1-3, 5, 13, 14, 19-23, 28 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Olry (US 4,790,052).

Olry discloses a method of producing a fibrous perform including moving a needle-penetrable mold plate (10,11) containing a discontinuous fiber material relative to a needling device (12), along a first direction (12b); see Fig. 1. The needling device includes a needle member (see needle board 12 carrying needles 13). While moving the needle-penetrable mold plate along the first direction (12b), needles are passed through the fiber material to change an orientation of the fibers until a predetermined fiber content percentage is obtained as claimed (col. 4, lines 3-58). Olry discloses a step of "permitting" or "allowing" the needle-penetrable mold plate to move along a second direction generally transverse to the first direction, i.e. in the vertical direction 12c; see col. 4, lines 12-18. This vertical movement forms the claimed "second direction" as in claims 1 and 28. The plate is moved in the first direction a plurality of times (see movement back and forth along arrow 12b) as in claim 2.

Also see the embodiment of Fig. 5, in which the mold plate (30,31) moves in a first direction (rotary movement) and a second direction (vertical movement along element 36), while undergoing needling (see 32,33), as in claim 1. Alternatively, the axial movement (col. 8, lines 25-27) of the mandrel could be interpreted as being in the

"second direction". The movement along the second direction occurs while moving the mold plate along the first direction, as in claim 3.

The fiber material comprises PAN-based fiber as in claim 5 (col. 6, line 27). The needling device is a needle loom as in claim 13, and the loom is a linear needle loom as in claim 14 (see Fig. 1 or Fig. 5). The needles pass through the mold plate (see 11 and 31) as in claim 19 (col. 4, lines 54-58 and col. 8, lines 16-21). The plate is moved along an upward angle (see Fig. 5, in which the rotary movement moves upwardly as the rotation comes back around) as in claim 20. Olry discloses carbonizing the fibers, densifying the fibers, and heat treating the fibers as in claims 21-23 (col. 6, lines 11-41; col. 7, lines 19-24 and col. 9, lines 24-27, lines 52-64). Regarding claim 29, the carbon is in the form of continuous filaments (col. 5, lines 36-38).

7. Claims 1-3, 10, 13-15, 18-20, 24-26, and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Fuchs (US 6,948,221).

Fuchs discloses a method of producing a nonwoven material including moving a needle-penetrable mold plate (belt 5) containing a discontinuous fiber material relative to a needling device (14), along a first direction (i.e. the machine direction, or revolving direction 11). The needling device includes a needle member (see needle board 14 carrying needles 16). While moving the needle-penetrable mold plate 5 along the first direction, needles 6 are passed through the fiber material to change an orientation of the fibers until a predetermined fiber content percentage is obtained, as claimed. Fuchs discloses a step of "permitting" or "allowing" the needle-penetrable mold plate to move

along a second direction generally transverse to the first direction, i.e. in the transverse direction as shown by arrow in Fig. 2 (col. 3, lines 24-27). This transverse movement forms the claimed "second direction" as in claims 1 and 28. The plate 5 is moved in the first direction a plurality of times as in claim 2; see repetitive rotary motion as depicted in Fig. 1. The movement in the second direction occurs while moving the mold plate along the first direction, as in claim 3. Regarding claim 10, the fiber material is provided in a mold cavity defined in the needle-penetrable mold plate; i.e. the spaces between bristles or brushes on the brush belt form mold cavities into which the fibers are displaced when the needles push the fibers into the brush belt to form loops, as disclosed in col. 1, lines 15-21 and col. 3, lines 12-18. The spaces between bristles or brushes on the brush belt which form mold cavities into which the fibers are displaced extend throughout the brush belt 5, being arranged along the first direction and transverse to the first direction, as in claims 24-26.

The needling device is a needle loom as in claim 13, and the loom is a linear needle loom as in claim 14 (see Fig. 1). The needle member passes through the fiber material through opposing sides of the fiber material, i.e. through the top side and the bottom side (see col. 1, lines 15-31 and col. 3, lines 12-18), as in claims 15 and 18. The mold plate 5 is inverted relative to the needle member between respective movements of the plate relative to the needling device; i.e. the belt 5 is inverted as it travels along the bottom course of its rotary movement as shown in Fig. 1. The needles pass through a part of the needle-penetrable mold plate 5 as in claim 19 (col. 1, lines 15-31). The

plate 5 is moved along an upward angle (see upwardly directed span of the moving endless belt 5; Fig. 1) as in claim 20.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 4, 6, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sheehan et al (US 5,740,593).

Regarding claim 4, Sheehan does not disclose the percentage of fiber which is entangled or which has a changed orientation due to the needling. It is within the ordinary skill in the art to determine the optimal amount of needling based upon the desired end properties of the product. It would have been obvious to one having ordinary skill in the art at the time the invention was made to needle the fiber material in the method of Sheehan until about 25% to about 35% of the fibers have changed orientations due to needling, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 6-7, Sheehan et al disclose a method as claimed, and teach the use of similar fiber material to that claimed, including carbon/ceramic composite structures, PAN fiber, OPF fiber, and material which forms carbon/carbon structures

(col. 4, line 47 through col. 5, line 3; col. 7, lines 1-3; and col. 8, lines 48-67). Sheehan does not specifically disclose the use of pitch-based carbon fiber or PAN-based carbon fiber with pitch-based carbon fiber, as in claims 6-7. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use such material in the method of Sheehan, since the use of such materials does not affect the method in a manipulative sense, and such materials are conventionally used in the art for making fibrous preform structures and it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

The step of moving the plate (12) along the second direction is performed mechanically (see adjustment mechanism 22, jackscrew 24 and motor/gearbox 26 in Fig. 1), as in claim 8.

10. Claims 4 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lawton et al (US 4,955,123).

Regarding claim 4, Lawton et al do not disclose the percentage of fiber which is entangled or which has a changed orientation due to the needling. It is within the ordinary skill in the art to determine the optimal amount of needling based upon the desired end properties of the product. It would have been obvious to one having ordinary skill in the art at the time the invention was made to needle the fiber material in the method of Lawton until about 25% to about 35% of the fibers have changed orientations due to needling, since it has been held that where the general conditions of

a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 5-7, Lawton et al disclose a method as claimed, and teach the use of similar fiber material to that claimed, including PAN -based carbon fiber (col. 4, lines 53 and 60). Lawton does not specifically disclose the use of pitch-based carbon fiber or PAN-based carbon fiber with pitch-based carbon fiber, as in claims 6-7. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use such material in the method of Lawton, since the use of such materials does not affect the method in a manipulative sense, and such materials are conventionally used in the art for making fibrous preform structures and it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 8, the step of moving the plate (40,74) along the second direction is performed mechanically (col. 10, line 28-67). The slide 150 (via handle 156) and various switches are actuatable manually, and thus the movement of the plate along the second direction may be performed "manually" to the extent recited in claim 9.

11. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuchs (US 6,948,221) in view of Best et al (US 5,864,931).

Fuchs discloses a method as claimed, including passing the needle member through opposing sides of the fiber material, by passing the needles through the

thickness of the fiber material (i.e. the needles are passed through the upper and lower sides of the fiber material). A step of passing the needle member through opposing sides of the fiber material by using a first and a second needling device from first and second sides of the mold plate, as in claim 16, is not disclosed. It is conventional to needle fiber webs from both sides of the web using two needling devices, with one positioned on each side. Best et al shows a step of needling the fiber material by passing a first needle member 40 through the material from a first side and passing a second needling member 39 through the material from a second side. As to claim 17, the first and second needling devices (39,40) are provided in the same linear needle loom, in that they are provided above and below one another as shown in Fig. 1, so as to form a double sided needling device. One having routine skill in the art would recognize that by needling the web of Fuchs from both sides, fiber loops may be provided on both sides of the fabric, so that a double sided fabric results. It would have been obvious to one having ordinary skill in the art at the time the invention was made to pass first and second needle members through the first and second sides of the fiber material of Fuchs, as is known in the art as taught by Best et al, in order to produce a double sided fabric having loops on both sides.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amy B. Vanatta whose telephone number is 571-272-4995. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Welch can be reached on 571-272-4996. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Amy B Vanatta/
Primary Examiner
Art Unit 3765